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NEW HETEROMYID RODENTS FROM NEVADA.

BY E. RAYMOND HALL,

*Museum of Vertebrate Zoology, University of California, Berkeley, California.*

In preparing an account of the mammals of Nevada, six heretofore unrecognized geographic races of species belonging to the Family Heteromyidae have been found. Names and descriptions for these are provided below.

***Perognathus longimembris gulosus*, new subspecies.**

*Type*.—Female, adult, skin with skull, no. 78764, Mus. Vert. Zool.; near  $\frac{1}{4}$  mi. S.] Smith Creek Cave, 5800 feet, Mount Moriah, White Pine County, Nevada; June 4, 1937; collected by Lee W. Arnold; original no. 259.

*Range*.—Known from western margin of the basin of the Pleistocene Lake Bonneville in eastern Nevada and western Utah.

*Diagnosis*.—Size medium for the species; upper parts Pinkish Buff (capitalized color terms after Ridgway, 1912), overlain with dark brownish and blackish; underparts with hair white all the way to base; tail bicolored, dusky above; skull broad across mastoids but mastoidal bullae of moderate length; maxillary tooth row short.

*Comparisons*.—From *P. l. nevadensis*, this form differs in having the hair of the underparts pure white all the way to the base rather than plumbeous basally and tipped with buffy. From *P. l. arizonensis*, *gulosus* differs in much paler (more grayish, less reddish) sides and upper parts. From *P. l. virginis*, *gulosus* differs in lighter (less blackish and less reddish) upper parts and sides and in smaller skull, especially the smaller mastoidal bullae. From *P. l. panamintinus*, *gulosus* differs in less ochraceous sides and shorter upper tooth rows.

*Measurements*.—Average and extreme measurements of 5 adult females from the vicinity of the type locality are: Total length, 132 (125-137); length of tail, 72 (70-74); length of hind foot, 17.8 (17-19); weight in grams, 7.5 (6.1-8.9); occipitonasal length, 21.1 (21.0-21.2); frontonasal length, 14.4 (14.0-14.6); mastoidal breadth, 12.5 (12.3-12.6); length of bulla (from posteriormost part to anteriormost part lateral to zygomatic arch), 8.2 (8.1-8.3); interorbital breadth, 5.2 (5.1-5.3); alveolar length of upper molariform tooth row, 3.0 (2.9-3.1).

*Remarks.*—Among named races, *gulosus* most closely resembles *P. l. panamintinus*. The only differences, so far as I can see, are the Pinkish Buff rather than Light Ochraceous Buff color, less extensive area of "reddish" color on sides, and shorter tooth row. The ranges of the two forms are not known to meet, apparently being separated by the ranges of *P. l. nevadensis* and *P. l. virginis*; the range of *nevadensis* in central Nevada extends southward to southern Lander County and the range of *virginis* in southeastern Nevada extends northwest through Lincoln County into Nye County.

*Specimens examined.*—Total number, 26, as follows: **Nevada:** *Elko Co.:* 13 mi. N. Montello, 5000 ft., 3; 8 mi. S. Wendover, 4700 ft., 12. *White Pine Co.:* near [ $\frac{1}{4}$  mi. S.] Smith Creek Cave, Mt. Moriah, 5800 ft., 2; 1 mi. S. E. Smith Creek Cave, Mt. Moriah, 5800 ft., 1; 2 mi. E. Smith Creek Cave, Mt. Moriah, 5600 ft., 3; 4 mi. E. Smith Creek Cave, 1. **Utah:** *Box Elder Co.:* Kelton, 4225 ft., 1. *Millard Co.:* 5 mi. S. Garrison, 5400 ft., 2.

***Perognathus formosus incolatus*, new subspecies.**

*Type.*—Female, adult, skin with skull, no. 78855, Mus. Vert. Zool.; 2 mi. W. Smith Creek Cave, 6300 ft., Mt. Moriah, White Pine County, Nevada; June 18, 1937; collected by Lee W. Arnold; original no. 360.

*Range.*—Known only from the type locality but judged to occur in suitable habitat over much of the basin of the Pleistocene Lake Bonneville.

*Diagnosis.*—Size medium; color grayish and pale, the upper parts a mixture of white, light buffy and reduced amount of blackish; sides with buffy markings faintly indicated; hind feet and underparts white; tail bicolored, buffy below and colored like upper parts above; skull with large tympanic bullae, maxillary arms of zygomatics inclined posteriorly and width across zygomatic arches less anteriorly than posteriorly.

*Comparisons.*—From *P. f. formosus*, this race differs in lighter color and in the shape of the interparietal which has the anterior border more nearly straight; in *formosus* the suture between the interparietal and the parietals has the form of an open, inverted V. From *P. f. mohavensis*, *incolatus* differs in the same way as from *formosus* but the difference in color is less.

*Measurements.*—Average and extreme measurements, of 4 adult females, are: Total length, 185 (177–190); length of tail, 102 (97–106); length of hind foot, 22.8 (22–23); weight in grams, 18.9 (16.8–21.5); occipitonasal length, 26.8 (26.0–27.3); frontonasal length, 18.1 (17.7–18.3); mastoidal breadth, 13.9 (13.7–14.4); length of bulla, 8.9 (8.8–9.1); interorbital breadth, 6.7 (6.4–6.9); alveolar length of upper molariform tooth row, 3.7 (3.7–3.7).

*Remarks.*—The taking of the specimens here recorded was the first evidence, that I know of, showing that this species ranges northward into the basin of the Pleistocene Lake Bonneville. Like races of other species from this area, the pallor of the coloration is noteworthy.

*Specimens examined.*—Total number, 5, all from Nevada, as follows: *White Pine Co.:* 2 mi. W. Smith Creek Cave, 6300 ft., Mount Moriah, 6300 ft., 2; near Smith Creek Cave, 5800 ft., Mount Moriah, 3.

***Perognathus formosus melanurus*, new subspecies.**

*Type*.—Female, adult, skin with skull, no. 73442, Mus. Vert. Zool.; 40° 28' N., 6 mi. E. California Boundary, 4000 ft., Washoe County, Nevada; July 7, 1936; collected by E. Raymond Hall; original no. 5070.

*Range*.—Smoke Creek Desert and vicinity: from S. W. Humboldt County, Nevada, south to Truckee River and from near Toulon, Pershing County, Nevada, west to vicinity of Stacy, eastern Lassen County, California.

*Diagnosis*.—Size large; color blackish over upper parts with faint tinge of buffy; underparts white, or buffy and white; hind feet buffy; tail black above, and below buffy or rarely with a black stripe; skull with small tympanic bullae, long frontonasal region, and widespread maxillary arms of zygomata causing jugals to be nearly parallel.

*Comparisons*.—From *P. f. mohavensis*, *melanurus* differs in larger size on the average, always in darker color of upper parts including dorsal tail stripe, and in smaller tympanic bullae. From *P. f. formosus* and *P. f. incolatus*, *melanurus* differs in the same way as from *mohavensis* although the color difference is less in comparison with *formosus* and more in comparison with *incolatus*. Furthermore, *formosus* and *incolatus* have the maxillary arm of each zygoma inclined more posteriorly, resulting in the zygomatic breadth being less anteriorly rather than about equal anteriorly and posteriorly as in *melanurus*.

*Measurements*.—Average and extreme measurements of 10 adult males and 11 adult females, from Washoe and Pershing counties, Nevada, are: Total length, ♂, 199 (187–211), ♀, 196 (185–211); length of tail, 107 (100–115), 108 (97–118); length of hind foot, 24.7 (23–26), 24.9 (23–26); weight in grams, 21.9 (19.8–24.7), 20.2 (19.2–23.3); occipitonasal length, 27.2 (26.5–28.2), 26.8 (25.5–27.3); frontonasal length, 18.8 (18.0–19.6), 18.5 (17.6–19.4); mastoid breadth, 14.3 (13.9–14.7), 14.0 (13.4–14.7); length of bulla, 9.0 (8.7–9.3), 8.8 (8.6–9.0); interorbital breadth, 6.9 (6.7–7.4), 7.0 (6.6–7.5); alveolar length of upper molariform tooth row, 4.0 (3.6–4.3), 3.8 (3.7–4.0).

*Remarks*.—Although the species *formosus* inhabits principally the Lower Sonoran Life-zone, the range of *melanurus* lies entirely within the Upper Sonoran Life-zone, albeit within the lower part of this zone. This is where *Sarcobatus* and *Atriplex* predominate, in many places to the exclusion of the zonally higher *Artemisia tridentata*. Like several other mammalian species which live mainly in the Lower Sonoran Life-zone, *P. formosus* occurs farthest north here in the low country along the eastern base of the Sierra Nevada.

Intergradation with the race *mohavensis* is suggested by specimens from several localities in Mineral County, Nevada, which, although darker than the average for *mohavensis*, are referable to that subspecies. So far as known, mice of the species *Perognathus formosus* do not occur in central Nevada or in most of eastern Nevada; hence the range of *melanurus* probably does not meet that of *P. f. formosus* or *P. f. incolatus*.

*Specimens examined*.—Total number, 45, as follows: **California:** Lassen

Co.: 4½ mi. W. N. W. Stacy, 3; 3 mi. N. W. Warm Spring, 1. Nevada: Washoe Co.: 1 mi. N. E. Gerlach, 4000 ft., 2; 40° 28' N., 6 mi. E. Calif. Boundary, 4000 ft., 8; 4 mi. N. W. Pahrump Peak, 4200 ft., 1; 2½ mi. E. Flanigan, 4250 ft., 4; 8 mi. E. Reno, 4500 ft., 1; N. side Truckee River, 10 and 11¼ mi. E. Reno, 4500 ft., 8. Humboldt Co.: 10½ mi. W. and 6 mi. N. Sulphur, 4000 ft., 1. Pershing Co.: 3 mi. S. W. Vernon, 4300 ft., 8; 30 mi. W. and 4 mi. N. Lovelock, 4300 ft., 1; 30 mi. W. and 3 mi. N. Lovelock, 4300 ft., 1; 3½ mi. N. E. Toulon, 3950 ft., 1; 1 to 3½ mi. W. Toulon, 4100 to 4500 ft., 5.

***Dipodomys ordii inaquosus*, new subspecies.**

*Type*.—Male, adult, skin with skull, no. 73580, Mus. Vert. Zool.; 11 mi. E. and 1 mi. N. Jungo, 4200 ft., Humboldt County, Nevada; July 26, 1936; collected by Ward C. Russell; original no. 5026.

*Range*.—Southeastern Humboldt County and northern Lander County, Nevada.

*Diagnosis*.—Size large excepting tail, which is relatively short; color pale; upper parts Pinkish Buff, lightly marked with dusky; white supraorbital spots large; dark arietiform facial markings almost obsolete; skull large; nasals long.

*Comparisons*.—From *Dipodomys ordii columbianus* (Merriam), *inaquosus* differs in relatively shorter tail, markedly lighter color, large rather than small supraorbital white spots, and lighter and less extensive arietiform facial markings. From *Dipodomys ordii monoensis* (Grinnell), the one other race whose range meets that of *inaquosus*, it differs in larger size in all parts measured and lighter color.

*Measurements*.—Average and extreme measurements of 5 adult males, from 8 and 11 miles to the eastward of Jungo, are: Total length, 246 (233–261); length of tail, 136 (125–142); length of hind foot, 39.7 (38–41); basal length (measured from anterior face of incisor), 25.6 (25.2–26.0); length of nasal, 13.7 (13.2–14.1); greatest breadth, 24.0 (23.1–24.8); maxillary breadth, 20.2 (19.8–20.6); interorbital breadth, 11.8 (11.6–12.0).

*Remarks*.—The pallor of coloration in this race almost equals that of *Dipodomys ordii celeripes* of the Bonneville Basin in western Utah and extreme eastern Nevada. The relatively short tail of *inaquosus* is found also in the actually smaller race *monoensis* to the southward. *D. o. inaquosus* resembles *monoensis* also in that the dorsal outline of the skull is more convex in longitudinal axis than in *columbianus*. The convexity is less in most specimens than in *monoensis*.

*Specimens examined*.—Total number, 50, all from Nevada, as follows: Humboldt Co.: 7 mi. N. Winnemucca, 4400 ft., 4; 1 mi. N. Winnemucca, 4600 ft., 8; 5 mi. N. E. Golconda, 7; 1 mi. W. Golconda, 3; 3 to 5 mi. S. W. Winnemucca, 4500 to 4600 ft., 4; 8 mi. E. and 1 mi. N. Jungo, 4200 ft., 6; 11 mi. E. and 1 mi. N. Jungo, 4200 ft., 8; 10 mi. S. W. Winnemucca, 4500 ft., 1; 23 mi. N. W. Battle Mountain, 4. Pershing Co.: 15 mi. S. W. Winnemucca, 1. Lander Co.: Izenhood, 2; 3 mi. S. Izenhood, 2.



**Microdipodops megacephalus sabulonis**, new subspecies.

*Type*.—Male, adult, skin with skull, no. 49381, Mus. Vert. Zool.; 5 mi. S. E. Kawich Post Office, 5400 ft., Kawich Valley, Nye County, Nevada; September 27, 1931; collected by Robert T. Orr; original no. 384.

*Range*.—Sandy and gravelly soils from eastern Esmeralda County eastward across Nye County to western Lincoln County, Nevada.

*Diagnosis*.—Tail and hind foot short; upper parts brownish with much reddish; distal fourth to sixth of tail dark brown or black; supraorbital and postauricular patches light buffy; feet light gray; underparts white but plumbeous basally; skull narrow; auditory bullae relatively uninflated; incisive foramina widest posteriorly.

*Comparisons*.—From *Microdipodops megacephalus megacephalus*, this race differs in more reddish, less blackish, colored upper parts, white rather than buffy tipping of hairs of underparts, and wider skull as measured across the auditory bullae. From *M. p. albiventer*, *sabulonis* differs in larger average size of all parts measured except greatest breadth of skull, which is about the same, and maxillary breadth which is less. In *sabulonis* the tail is relatively longer, the upper parts are darker, the tail is more extensively tipped on the upper surface with black and the hair of the underparts is ordinarily plumbeous basally rather than white all the way to the base. Comparison with *M. p. ruficollaris* is made in the account of that race.

*Measurements*.—Average and extreme measurements of 4 adult males and 5 adult females from the type locality are: Total length, ♂, 153 (150–158), ♀, 155 (150–159); length of tail, 84 (81–86), 85 (81–88); length of hind foot, 24.6 (24–25), 23.6 (22.3–24.0); basal length (measured from anterior face of incisor), 18.1 (17.3–19.1), 18.3 (17.5–19.0); nasal length, 9.8 (9.5–10.1), 10.0 (9.7–10.3); greatest breadth, 18.9 (18.1–20.0), 19.0 (18.3–19.5); maxillary breadth, 11.6 (11.2–12.4), 11.8 (11.3–12.1); least interorbital breadth, 6.6 (6.3–6.8), 6.4 (6.1–6.8).

*Remarks*.—Intergradation with *M. m. megacephalus* to the northward is shown by several series of specimens referred to that race, as for example those from Ralston Valley, 5800 ft., 15½ miles northeast of Tonopah and some from Old Mill, north end Reveille Valley, 6200 ft., both places in Nye County.

*Specimens examined*.—Total number, 413, all from Nevada, as follows: *Esmeralda Co.*: 13½ mi. N. W. Goldfield, 4850 ft., 22. *Nye Co.*: 4 mi. S. E. Millett, 5500 ft., 17; 5 mi. S. E. Millett, 5500 ft., 4; 4 mi. S. Millett, 5500 ft., 5; 11½ to 13 mi. N. E. San Antonio, 5700 to 6700 ft., 26; 4¾ to 6 mi. N. E. San Antonio, 5640 to 5700 ft., 29; 17 mi. W. Sunnyside, White River Valley, 12; 9 mi. W. and 3 mi. S. Tybo, 6200 ft., 43; 15 to 16½ mi. W. S. W. Sunnyside, White River Valley, 5500 ft., 11; 14 to 15 mi. N. E. Sharp, Garden Valley, 23; 8½ mi. N. E. Sharp, Garden Valley, 28; 34 mi. E. and 1 mi. N. Tonopah, 5650 ft., 6; N. shore Mud Lake, S. end Ralston Valley, 5300 ft., 2; 1½ to 3–2/5 mi. S. Silverbow, Kawich Mountains, 6200 to 6400 ft., 19; 5 to 6½ mi. S. W. Silverbow, Cactus Flat, 5700 to 6000 ft., 18; 11½ mi. S. W. Silverbow, Cactus Flat, 5400 ft., 9; 14 mi. S. E. Goldfield, Stonewall Flat, 4700 ft., 2; 7½ mi. E. Cliff Spring, 5900 ft., 37; 4½ mi. N. W.

Indian Spring, Kawich Valley, 5700 ft., 6; 5 to 5-7/10 mi. S. E. Kawich P. O., Kawich Valley, 5400 ft., 12. *Lincoln Co.*: 14 mi. N. Seeman Pass, 4850 ft., E. side Coal Valley, 26; 10 mi. N. Seeman Pass, 4650 ft., Coal Valley, 14; 17 mi. N. Groom Baldy, Penoyer Valley, 14; 14 to 15 mi. N. N. W. Groom Baldy, Penoyer Valley, 8; 9 mi. W. Groom Baldy, 5500 ft., 13; 11½ mi. E. Johnnies Water, 1; 14½ to 15 mi. S. Groom Baldy, 6.

***Microdipodops pallidus ruficollaris*, new subspecies.**

*Type*.—Female, adult, skin with skull, no. 49254, Mus. Vert. Zool.; 5 mi. S. E. Kawich Post Office, 5400 ft., Kawich Valley, Nye County, Nevada; September 25, 1931; collected by Robert T. Orr; original no. 367.

*Range*.—Fine sands of valleys from western Nye County eastward to western Lincoln County, Nevada.

*Diagnosis*.—Tail and hind foot long; upper parts near (e) Light Pinkish Cinnamon mixed with blackish, with a broad collar of more nearly cinnamon color; tail bicolor, corresponding to body and without black or dark brown at tip; supraorbital spots white or white with wash of faint buffy color; postauricular patches white; feet white; fur of underparts everywhere white to base; skull broad; auditory bullae much inflated; incisive foramina parallel-sided.

*Comparisons*.—From *M. p. pallidus*, *M. p. dickeyi*, and especially from *M. p. lucidus*, this race differs in more reddish upper parts and presence of the cinnamon colored collar. From *M. p. albiventer*, *ruficollaris* differs in more reddish color, presence of the collar, larger size of all parts measured, relatively longer tail, absence of the dusky or blackish markings on the tip of the tail, and in narrower incisive foramina.

From *M. m. sabulonis*, *ruficollaris* differs in longer hind foot, lighter coloration of upper parts, top of tail distally white rather than black, presence of the cinnamon collar, hair of underparts white to base rather than basally plumbeous, greater breadth across auditory bullae, greater maxillary breadth, greater interorbital breadth, upper incisors less recurved, premaxillae extending farther behind nasals, and incisive foramina parallel-sided rather than widest posteriorly.

*Measurements*.—Average and extreme measurements of 3 adult males and 7 adult females, from the type locality, are: Total length, ♂, 157 (156–158), ♀, 161 (154–164); length of tail, 85 (83–88), 89 (85–91); length of hind foot, 25.0 (25–25), 25.2 (25–26); basal length, 18.2 (18.1–18.2), 18.4 (18.0–18.7); nasal length, 9.7 (9.5–9.9), 10.0 (9.7–10.3); 19.3 (19.2–19.4), 19.7 (19.4–20.1); maxillary breadth, 12.0 (11.8–12.1), 12.3 (12.1–12.7); least interorbital breadth, 6.7 (6.7–6.8), 7.0 (6.7–7.3).

*Remarks*.—This race, like the other named races of the species *Microdipodops pallidus*, occurs in fine sand whereas *M. m. sabulonis*, like *M. m. megacephalus*, lives often in coarse sand or gravelly soil. At the eight localities where *ruficollaris* and *sabulonis* have been taken together, there was sharp segregation of the two kinds of mice according to the difference in soil just described. At these places the skins-alone or skulls-alone are readily distinguished by the differences mentioned under the heading of comparisons.

*Specimens examined.*—Total number, 165, all from Nevada, as follows: *Nye Co.*: 9 mi. W. and 3 mi. S. Tybo, 6200 ft., 2; 34 mi. E. and 1 mi. N. Tonopah, 5650 ft., 39; N. shore Mud Lake, S. end Ralston Valley, 5300 ft., 10;  $1\frac{1}{2}$  to  $3\frac{2}{5}$  mi. S. Silverbow, Kawich Mts., 6200 to 6400 ft., 3;  $11\frac{1}{2}$  mi. S. W. Silverbow, Cactus Flat, 5400 ft., 5; 6 mi. W. Kawich P. O., Gold Flat, 5100 ft., 5; 5 to  $5\frac{1}{2}$  mi. W. Kawich P. O., Gold Flat, 5100 to 5200 ft., 8; 5 to  $5\frac{7}{10}$  mi. S. E. Kawich P. O., Kawich Valley, 5400 ft., 46; 6 mi. S. W. Kawich P. O., Gold Flat, 5100 ft., 12. *Lincoln Co.*: 17 mi. N. Groom Baldy, Penoyer Valley, 25; 14 to 15 mi. N. N. W. Groom Baldy, Penoyer Valley, 10.